1400-11 CONSTRUCTION PHASING

Schedule a Pre-Lighting-Work meeting before beginning work on the lighting system. Include staff members from the prime contractor, electrical sub-contractor, Resident Engineer's office and the Lighting and Electrical Squad in the Roadway Design Unit in Raleigh

Accomplish lighting work along with other roadway construction in the appropriate phases as indicated in the Traffic Control Plans and these Specifications.

1400-12 MEASUREMENT AND PAYMENT

There will be no direct payment, except where specifically noted in the Subarticle 1400-3(C) and Article 1400-9 for the work required in the preceding sections of this division. Payment of the contract unit prices for the various items in the contract will be full compensation for all work required.

1400-13 CONTRACTOR MEG CIRCUIT DATA FORM

The Electrical Sub-contractor is responsible for completing the Meg Circuit Form and submitting the insulation resistance data to the Lighting and Electrical Squad of Roadway Design Unit for review before final inspection. A copy of the Contractor Meg Circuit Data Form is available on the Roadway Design Unit's website.

1400-14 LIGHTING SYSTEM INSPECTION CHECKLIST

The Engineer is responsible for scheduling the lighting system final inspection by contacting either the Special Design Section or the Lighting and Electrical Squad of the Roadway Design Unit. The Lighting and Electrical Squad will coordinate with project inspector and electrical subcontractor to have the checklist items inspected during the final inspection and in preparation of the lighting inspection punchlist. A copy of the inspection checklist is available on the Roadway Design Unit's website.

SECTION 1401
HIGH MOUNT STANDARD

1401-1 DESCRIPTION

Design, furnish and install a high mount standard 60' or greater in height with a top-latched lowering device and portable drive unit including the drive, winch, wiring, cables, brackets, hardware, transformer, power cord, storage case and operating manuals.

1401-2 MATERIALS

(A) High Mount Standard

Provide certified computations and fabrication drawings by a professional engineer licensed in the State of North Carolina.

Design the support including base plate and anchorage in conformance with the *AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, Fourth Edition, 2001* and the Interim Specifications valid at the time of letting. Use Fatigue Category II. Design and fabricate welds in accordance with Article 1072-18. Design the support for the wind velocity shown in the plans.

Have the drawings show all details relating to pole, access hole, base, anchorage and lowering device. Show references to ASTM specifications or to other material specifications for each type of material used on the drawings. Note the total weight in pounds on the drawings for each component and the total assembly. Make sure that all drawings are clearly identified with a drawing number and signed and dated by the manufacturer's authorized representative.

Show clearly full and complete information regarding location, type, size and extent of all welds on the drawings. For groove welds, indicate the particular detail and process to be employed in production of the work. For prequalified joints, use of the Structural Welding Code - Steel, AWS D1.1 letter classification designation of the joint (B-L2b-S, etc.) will satisfy this requirement.

The standard may be either a multisided or round tubular member.

The criteria listed below shall apply to 60-ft, 80-ft, 100-ft and 120-ft high mount light poles:

(1) Provide 8 or more anchor rods for each pole.

(2) Provide base plate thickness of at least 2.5".

(3) Provide welded wire reinforcement for base protection that meets Subarticle 1400-4(I).

Furnish 8 copies of complete detailed drawings and one copy of the complete design computations for each height of standard for approval before fabrication.

The Contractor's attention is directed to the fact that it will take 10 weeks to secure approval after submission of the complete drawings and computations.

Fabricate the support in accordance with the details shown on the approved shop drawings and the Specifications.

Test all base plate to upright welds using magnetic particle testing (MPT) before galvanizing. All base plates must be tested at 100%. Radiographically test the longitudinal seam welds within 6" of circumferential welds in the outer tube of the slip fit joint area.

Hot dip galvanize metalwork after fabrication has been completed. Ensure the galvanization conforms to ASTM A153 for fasteners and ASTM A123 for other structural steel.

Partial penetration longitudinal groove welds on shaft sections, having a minimum throat of 60% of the thickness of material being joined, will be acceptable provided the qualification requirements of the Structural Welding Code - Steel, AWS D1.1 are met. However, full penetration will be required on longitudinal groove welds within 6" of circumferential welds and in areas where a shaft section telescopes over another shaft section. No field welding of any part of the assembly will be permitted.

Allow easy access to all components in the base of the standard with a hand hole with a hinged and lockable door. Allow for opening of the door without the use of special tools or wrenches. Make the hand hole large enough for removal of the circuit breaker and the hoist gearbox and winch assembly (at least 9" x 18".) Make the door hinge and lock mechanism sturdy enough to prevent vandalism and to prevent freeze-up or binding due to corrosion or too tight fit. Achieve locking with a conventional padlock. Built-in locks or latching mechanism for the door will not be acceptable.

(B) Lowering Device

Furnish 8 copies of complete detailed drawings of the lowering device with manuals describing the assembly, erecting and operating procedures. Include precise instructions on stringing the cables and leveling the carrier ring.

Each high mount lighting standard shall have a device to lower the luminaires from the operating position at the top of the standard to a service position approximately 3 ft above the base of the standard. Include on the device a head-frame, top latching carrier ring and winch assembly. Design the lowering device for the number of luminaires as shown in the plans, each weighing and each having a projected area in accordance with Section 1403.

Mount the head frame on the standard with a slipfitter and set screws, and have sheaves or rollers for the lifting and power cables. Ensure sockets automatically secure the carrier ring at the top in the raised position and provide a hood on the entire assembly for protection from the weather. Attain latching and unlatching by alternately raising and lowering the carrier ring. Use sheaves that are non-corrosive materials with bronze bushings and stainless steel shafts. Provide suitable retainers to assure that the cables stay in correct position.

Have slipfitter tenons equally spaced for mounting the luminaires on the carrier ring. Have the carrier ring automatically latched to the head frame when raised into position by suitable pins and sockets which will prevent the luminaires from swaying, turning, vibrating, or otherwise moving out of proper position. Include on the carrier ring spring loaded roller arms to guide the ring during raising and lowering operations. Use springs made of stainless steel and rollers made of nylon. Mount a metal NEMA 3R weatherproof junction box on the ring for connection of individual luminaire circuits to the electrical power supply cable. Include in the junction box a flanged inlet for connection of the power supply cable. Use an inlet and cable connector which is of the locking type and weatherproof.

Use a winch assembly that is a self-locking worm gear type designed for operation with a portable power unit. Have the winch drum automatically reverse the lay of the hoist cable and prevent uneven build-up or tangling.

Provide a terminator for joining the hoist cable and 3 suspension or lifting cables. Provide the means to compensate for variations in the lengths of the 3 lifting cables. Use hoist and lifting cables made of stranded high strength stainless steel extra flexible aircraft type. Use hoist and lifting cables that meet structural requirements of Military Specification MIL-W-83420E and have the center strand not protruding more than 0.06" after the cable is cut.

Use a power supply cable that is rated for suspension and has approved strain relief fittings at each end. At the base of the standard, provide a locking type plug with waterproof cover to connect to a short power supply cable stubbed from the circuit breaker panel.

(C) Portable Drive

Supply a portable drive unit with a heavy duty reversible electric motor with torque limiter type drive of adequate capacity, complete with a grounding type cord, suitable couplings for attaching the unit to the winch assembly, and a sturdy storage container for the unit and accessories involved. Provide one portable drive unit for the completed project. Provide a drive unit with a lever switch controller with clearly marked up and down positions. Connect the controller to the drive unit with a cord of sufficient length to let the operator stand a minimum of 15 ft from the base of the high mount during lowering or raising operations.

Shop assemble the portable drive unit and remove all rough edges. Use mounting or adjustment bolts which allow hand tightening.

Provide a complete unit that includes a durable metal storage case with all equipment and instructions for operation. Use a case which is the approximate size as shown in the plans, has a continuous hinge on the lid, and has sturdy carrying handles on each end. Furnish a hasp with padlock as shown in the plans. Construct the case with 16 gauge formed and welded steel with bracing to prevent warping. Paint the inside and outside with a durable quality paint. Provide an identification label as noted in the plans on the storage case.

(D) Circuitry

Install an enclosed circuit breaker in the base of the high mount standard. Use a breaker which is rated 480 VAC, 2 pole, 30 A, and a minimum interrupting capacity of 14,000 A unless noted otherwise in the plans.

Provide a supply cord originating from the circuit breaker with a female twist lock connector for testing the luminaires at ground level, during lowering operation using the portable drive unit and when in the raised position during normal night operation.

Provide a junction box mounted on the lowering ring with a flanged inlet to accept the female twist lock connector from the supply cord. Use plugs, flanged inlets and connectors for the supply cable and drive unit which allow grounding and are weatherproof.

Install the wiring for each high mount luminaire separately from the luminaire to the junction box. Series or loop circuitry is not allowed.

Provide a transformer, branch circuit breaker and GFCI receptacle as a power source for the portable drive.

Provide an equipment grounding conductor in the supply cable. Include an equipment grounding conductor in the wiring for each luminaire.

(E) Operation

Demonstrate the operation of the lowering device by raising and lowering the carrier ring with luminaires a minimum of 5 times for each high mast. Include in this demonstration latching and unlatching at the top and connection of test cables at the bottom. Twisting of the cables, failure of the carrier ring to latch or unlatch, unlevelness of the carrie or hang-up of guide arms will be sufficient reason not to accept the lowering device.

1401-3 CONSTRUCTION METHODS

Use suitable blocking and slings to prevent warping of the high mount standard during storage and transportation. Assemble all parts and string all cables in strict accordance with the manufacturer's instructions.

Make sure that the top of the standard is not out of plumb more than 0.5% of its height.

Include assembly instructions and any special tools, blocks, washers, etc. in the portable drive storage case.

Remove all dirt, stains, marks, etc. before erecting the high mast.

1401-4 MEASUREMENT AND PAYMENT

High Mount Standards with lowering devices to be paid will be the actual number of standards installed and accepted. High mount lighting standards with lowering device, measured as provided above, will be paid at the contract unit price each for ____ *High Mount Standard* of the appropriate height.

Portable Drive Units with storage cases to be paid will be the actual number of portable drive units furnished and accepted. Portable drive units with storage case, measured as provided above, will be paid at the contract unit price each for Portable Drive Unit.

Payment will be made under:

Pay Item	Pay Unit
____ High Mount Standard	Each
Portable Drive Unit	Each

SECTION 1403
HIGH MOUNT LUMINAIRES

1403-1 DESCRIPTION

Furnish and install luminaires, including lamps and ballasts, for high mount standards 60 ft and greater in height.

1403-2 MATERIALS

Provide luminaires consisting of a die cast aluminum ballast housing a cast aluminum slipfitter housing, and cover which do not weigh more than 65 lb and have an effective projected area not more than 2.5 sq.ft.

Provide ballast capable of operating a high pressure sodium lamp from a source with a nominal voltage as shown in the plans with a tolerance of ± 10%. Provide luminaires with IES Distribution, Cutoff, Type V and the wattage shown in the plans. The Department will evaluate photometric data for submitted luminaire to ensure adequate light output from the fixture.

Provide slipfitter housing suitable for use with 2" horizontal mounting, adjustable for leveling, and which secures the mounting assembly to prevent twisting of the luminaire about the bracket.

Use an optical assembly which contains a porcelain enclosed mogul socket with spring loaded center contact . Position the socket for base up lamps.

Provide complete photometric, assembly and electrical data for each type luminaire proposed. Include in the data candlepower distribution and isofootcandle graphs, assembly drawings with replacement part numbers and electrical schematic with ballast input, output, voltage, amperage and wattage ratings.

Provide same model lamps from same manufacturer for each respective luminaire type.

1403-3 CONSTRUCTION METHODS

Lamp all high mount fixtures just before testing the system.

Level and secure each luminaire in all directions. Careful attention should be given to aim the main beams and house-side outputs of all asymmetrical units in the direction indicated in the plans. Securely terminate the wiring for each luminaire and include an equipment grounding conductor to bond the housing to the supply cord grounding conductor.

1403-4 MEASUREMENT AND PAYMENT

High Mount Luminaires ____ of the appropriate wattage and type will be measured and paid as the actual number of luminaires of each size and type installed and accepted.

Payment will be made under:

Pay Item	Pay Unit
High Mount Luminaires ____	Each